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ABSTRACT

One of a series of experimental units for preschool children, this unit deals with basic number concepts. The booklet includes a short discussion of mathematical background, an outline of the unit, a discussion of the objectives, and sequences of learning activities for the children. The appendices contain worksheets used in the unit. For other units in this series, see SE 016 125 through SE 016 129. (Author/DT)

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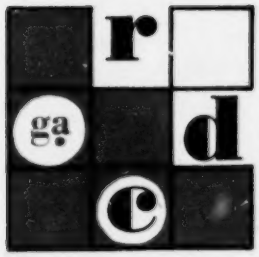
Practical Paper No. 10

MATCHING

William D. McKillip

July, 1969



Research and Development Center in Educational Stimulation

University of Georgia Athens, Georgia

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Athens, Georgia
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Note To The Teacher

This is an experimental unit dealing with concepts which we hope to develop before taking up number ideas in a more direct way. In this booklet you will find a short discussion of mathematical background, an outline of the unit, a discussion of the objectives of the unit, and sequences of learning activities for the children. The time required for this unit will depend on the age and previous experiences of the children; we estimate that this unit will take from two to five weeks.

It is the intent of the author of this unit to make these activities so naturally pleasant for children that they will engage in them without outside compulsion. If you find that you have to force a child to take part in these activities, it would be better to let that child do something else for a time. Children should not, however, be excused from participation on the basis of a passing whim or momentary attraction to something else. Please try to make the suggested activities game-like or playful in spirit. It is, after all, not essential for a child to do these things, although we do feel it is desirable.

One question deserves a rather extended explanation. Throughout this unit children will be encouraged to do a variety of tasks, some more difficult and some less difficult. Every child will experience failures and successes. In total, how we respond to a child's failures and successes will have an impact on his ultimate attitude toward school, teachers, and learning. Of course, a correct answer deserves a rewarding response, one which indicates that you are pleased with the child and happy that he has succeeded. If a child does a task incorrectly, how shall we respond? Try not to say "no," or "that is wrong." Instead, go back to the learning activity and ask yourself "How was the child to get the answer to that question?" By recalling the learning activity try to get the child to see how he could have found the correct answer and why his

answer was wrong. In this way you are a guide to thinking processes and not a judge of the product. This is an experimental unit. If it goes well, we are all happy. If it goes badly, it is because the unit needs improvement and not because of you. Please let us know if you find difficulty in using this material. We stand ready to help you change or supplement the material, or to withdraw it if it is not working.

William D. McKillip

MATHEMATICAL BACKGROUND

This unit deals with the topic of one-to-one correspondence and equivalent sets. Look at the one-to-one correspondence illustrated in figure 1: The set of X's and the set of O's are in one-to-one correspondence because there is a way to connect them so that for each X there is just one O and for each O there is just one X. If two sets can be put in one-to-one correspondence they are said to be equivalent sets. For the children, we will say that such sets "match." Equivalent sets, that is, sets which can be put in one-to-one correspondence, have the same number of elements and so equivalent sets can be used to introduce number concepts. These expressions are often used in talking about equivalent sets: As many as, one for each, the same number as. We may say "Are there as many chairs as children?," "Bring one cookie for each person at your table" or "Do you have the same number of red blocks as green ones?" This concept can enable the student to operate effectively in quantitative situations prior to the time that cardinal-number concepts appear. In fact, it seems likely that thinking like this precedes the formation of number concepts.

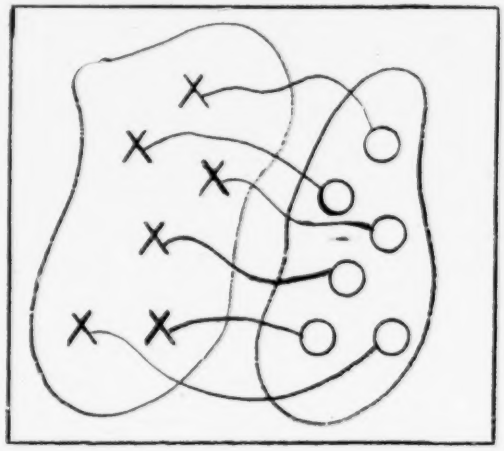
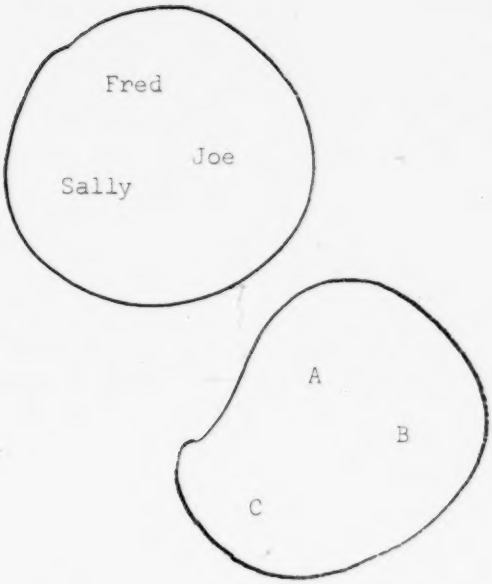


Figure 1

To show that two sets are equivalent (that is, match), a one-to-one correspondence between their elements must be found. There are usually many ways to set up the one-to-one correspondence and no one way is better, mathematically, than any other. Here are some examples.



There are 6 different ways to set up a one-to-one correspondence between these sets. Can you fill in the blanks and find the others? Try!

1.

A — Fred

B — Sally

C — Joe

2.

A — Fred

B — _____

C — Sally

3.

A — Joe

B — Fred

C — _____

4.

A — Joe

B — _____

C — _____

5.

A — _____

B — _____

C — _____

6.

A — _____

B — _____

C — _____

For the children, the construction of a one-to-one correspondence will be treated as a process of forming pairs or pairing off elements from two sets. Thus the children will form pairs or pair off elements as in figure 1 or in other ways and conclude that the sets match or do not match, as the case may be. If the sets match the children will use the phrases "as many as" and "the same number as" to describe this relationship. If the sets do not match, the children will use the phrases "not as many as," "not the same number as" and also "more" and "less" to describe the relationship.

Many students have a tendency to confuse ideas of numerousness with the perception of size. "Bigger means more" is the idea they seem to have. Even adults can be fooled by cleverly arranged materials where perceptions of size

are involved; we call these optical illusions. Because of this tendency a number of activities are included in this unit for the purpose of helping the children to acquire number concepts by concentrating on the number of elements in a set and the matching relationship of that set with other sets and by ignoring size and arrangement characteristics of elements of the set.

UNIT ORGANIZATION

The mathematical background for this unit leads directly to the unit outline. There are four activity sequences in this unit each of which is designed to accomplish specific obmectives.

1. Pairs. The formation of pairs in the ordinary sense: Two objects having certain common characteristics, such as a pair of shoes.
2. More Pairs. The formation of pairs by source: In each pair, one member comes from one set and the other from a second set.
3. Matching. Comparing sets by pairing their elements to determine whether the sets match, that is, are equivalent, or not.
4. More Matching. Matching sets of objects with emphasis on ignoring size and position; matching and unmatching.

The development of topics within each activity sequence proceeds in the fairly uniform way. The first learning activities are usually whole-group activities including active participation on the part of the children and statements are suggested and possible answers analysed. These activities are carried out with concrete materials. The second phase in an activity sequence is small group work with concrete and semiconcrete materials. The final phase is individual work with semi-concrete materials in the form of activity sheets and booklets.

The organization of this unit into "daily lessons" is not attempted. The activities are sequenced in a way which we consider natural and desirable (although this, too, will be altered if you report difficulties), but the quantity of work you and the children are able to do in a day depends on many factors we can't anticipate. Will you please tell us, by marking on this activity booklet, approximately the time spent on each activity?

Feel free to skip any activities which the children have mastered. In this activity booklet mark an activity "skipped" if you skip it, but first verify that the concepts and ideas involved are clear to the children. If you feel that your group could benefit at any point from more material than is provided, you may either invent it yourself but keeping, please, a record of what you do, or inform us and we will supply the material you need.

UNIT OBJECTIVES

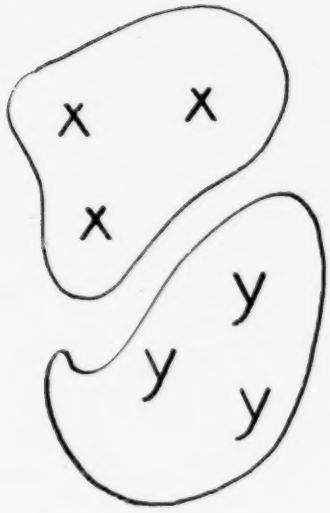
Mathematical Content Objectives:

1. The child understands that if the elements of two sets are in one-to-one correspondence, then there are the same number of elements in each set.
2. The child understands that if two sets are in one-to-one correspondence, then the correspondence is preserved when the elements are physically rearranged.

Word Usage Objectives:

The child uses correctly the following words and phrases with understanding. Many synonymous or virtually correct expressions will occur, and these should be treated as correct.

1. If two sets can be put in one-to-one correspondence we say: The set of X's "matches" the set of Y's; the set of X's "can be paired with" the set of Y's.



2. If two sets "match" we say: There is "one X for each Y"; there are "as many" X's as Y's; there are "the same number" of X's as Y's.

3. If two sets do not match we say: One set has "more," the other "fewer" (or "less" although "fewer" is preferred); the sets "do not match" each other and "cannot be paired"; there are "not as many" in one set as the other; the sets "do not have the same number" of elements.

Behavioral Criteria:

It is unlikely that a single unit of instruction will make a substantial change in the status of many children in the area of conservation. We do feel that matching and conservation experiences will provide a good introduction to the year's work and that the total program over the period of one year may have an appreciable effect on this variable.

1. The children compare sets by pairing them element-by-element and conclude that, for two sets A and B, A and B match or A and B do not match. Sets A and B have a small number of elements.
   a. The children make this type of comparison with concrete and semi-concrete sets.
   b. The children make this type of comparison when asked "Please

match...," "Do these sets match?"; "Are there as many...?", etc.

c. The children make this type of comparison when appropriate without specific instructions; for instance, in handing out pencils to or sharing candies with other children, they bring just enough to give one to each child without being told to do so.

d. The children correctly use the words and phrases listed in word usage objectives.

2. The children are becoming less distracted by the perceived physical properties of sets in accomplishing the objectives listed in item one.

a. The children will behave as described in objective 1 (above), even though physical rearrangement has occurred.

b. The children will make correct judgements about matching, even though the element size in the two sets is different.

ACTIVITY SEQUENCE I

Pairs

Objectives:

1. Each child knows the common uses of the word, pair, that is, two things which are alike in certain respects.
2. Each child can form pairs of objects on the basis of certain characteristics of objects.

Activity 1:

Game: Whose Shoes? All children sit in a circle and 4 children put their shoes in a box in the middle. Other children go to the box and pick out a pair of shoes and find the person who owns the shoes. When a child has picked a pair ask him, "How do you know that is a pair?" or "Why do you think that is a pair?" Encourage the children to talk about the "pair quality" of the shoes, describing ways they look alike.

When the child guesses Whose Shoes, he should use all the available information to make his guess as good as possible. For example, if there is only one pair of girls shoes and only one barefoot girl, the connection can be used to guess correctly.

You, as teacher, can point up the characteristics of good thinking by illustrating errors. You take a turn and pick two shoes which do not form a pair. Then the children can tell you what is wrong; they get a chance to express the ways in which the shoes are not alike.

Game: Pick-a-Pair. Put a large box at each end of the room. In one box put 5 right shoes and in the other put the matching left shoes. One child takes a shoe out of the left-shoe box and shows it to another child, who may

examine it as long as he wants. The second child must then go to the right shoe box and Pick-a-Pair.

Game: Advanced Pick-a-Pair. Instead of shoes use two sets of Logic Blocks. Same rules as Pick-a-Pair.

Game: Descriptions. Played with left and right shoes or two sets of Logic Blocks. Child A at one box, child B at the other. A picks a shoe (block) and tells B about it without showing it. B trys to pick the matching shoe (block) to make a pair.

Activity 2:

Small groups work at tables.

Arrangements:

4 to 6 students at each table or seated on floor in groups of 4 to 6

Materials:

Logic Blocks

Materials Distribution:

Table 1: All large, thick blocks from two sets

Table 2: All large, thick blocks from the other two sets

Table 3: All large, thin blocks from two sets

Table 4: All large, thin blocks from the other two sets

Table 5: All small, thick blocks from two sets

Table 6: All small, thick blocks from the other two sets.

NOTE: If the children have not used logical blocks before, ample time should be provided for the children to play with the blocks in a free-play atmosphere.

Ask the children to find pairs of blocks which are exactly alike. Many such pairs exist. In the restricted sets in use two blocks will be exactly alike if they are the same shape and the same color. You may, if you wish, take this opportunity to teach color names and shape names. Praise each child when he finds a matching pair, but do not criticize a child who presents an unmatched pair: Ask him "Are those blocks the same shape?" or "Are those blocks the same color?" Show the child an example (two blocks which do match in shape and color), and ask him to find another pair which match.

Feel free to invent other ways in which to work the word pair and the idea of forming pairs into your lessons. Be careful not to use things like a "pair" of pants - really just one object - because it does not contribute at this stage to the understanding of pair.

ACTIVITY SEQUENCE II

More Pairs

Objectives:

1. Each child is to learn the mathematical use of the word, pair. Any two things, whether alike or not, form a pair; any set of two objects is a pair.
2. Given two sets, A and B, of objects, the child can form pairs by choosing one member of each pair from A and the other from B.

Activity 1:

In this activity some children will form pairs while others watch; all children will be encouraged to talk about what they are doing. The children will work as a whole class.

Materials:

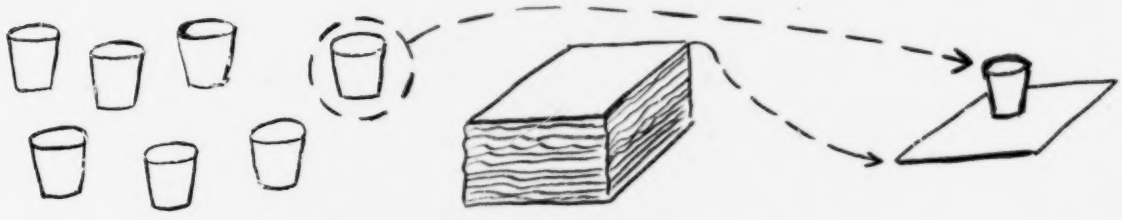
Cups and napkins, paper and pencils, bats and balls, etc.

Arrangements:

Class works as a whole.

Activity:

From a supply of cups and a supply of napkins (have more than enough), a child will take one of each and set a place on a table:



The children should talk about forming pairs. What should be in the pair of things at each place? (cup and a napkin) Did John (or Sam or Sue...) get a proper pair on the table?

The teacher or an aide or a visitor may now do the pair-forming incorrectly. Examples of incorrect place settings:

2 cups

2 napkins

2 cups on 1 napkins

The idea of pairing incorrectly is to give the children an opportunity to talk about the error made and to correct the error. The comments which come from the children, sometimes in response to your questions, are the important thing here. You may extend this activity as long as is necessary or until the children understand the idea of a pair, one member of which comes from one set and the other member comes from a second set. Some materials you may use are: Cups and saucers, bats and balls, boys and girls, paper and pencils, etc., etc.

The sequence of activities should be the same with each of these materials:

a. Identify the two sets from which pair members come, and show the children what constitutes a pair.

b. Have the children form pairs and talk about what they are doing.

c. Have someone make errors in pair formation, and get the students to express why the pair was not formed correctly and what needs to be done to correct it.

Activity 2:

In this activity all children will participate in forming pairs and in the discussion of the activity. They will work in small groups, usually

around a table.

Materials:

Logic Blocks, 4 sets

Arrangements:

Seat children at tables, 4 to 6 children at each table, or on the floor in groups of 4 to 6.

Material Distribution:

Table 1: All large, thick, red and large, thick, yellow blocks from 2 sets

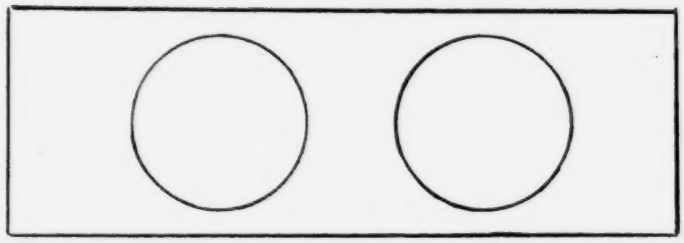
Table 2: All large, thick, red and large, thick, blue blocks from 2 sets

Table 3: All large, thick, yellow and large, thick, blue blocks from 2 sets

Tables 4, 5, and 6: Same as tables 1, 2, and 3, but using the other two sets

Activity:

Begin with the blocks in a jumble in the center of the table. The children should then sort the blocks into two sets by color. The sorting of the blocks may be facilitated by circles of string, colored poster paper, hoola hoops or simply circles drawn on the table.



Ask the children to form pairs now by taking one block from each set; each pair will consist of two blocks of the same shape but of different colors. Try to get the children to talk about what they are doing. You form a pair incorrectly. Ask "Is this right?" No "Why not?" "How could we make it right?"

This activity may be repeated as often as necessary using, for example, red and black checkers, cowboys and horses, etc., until you think that the children have grasped the idea.

Activity 3.

In this activity all children will participate in seat work with a work sheet and counters. The children will be encouraged to talk about their work.

Materials:

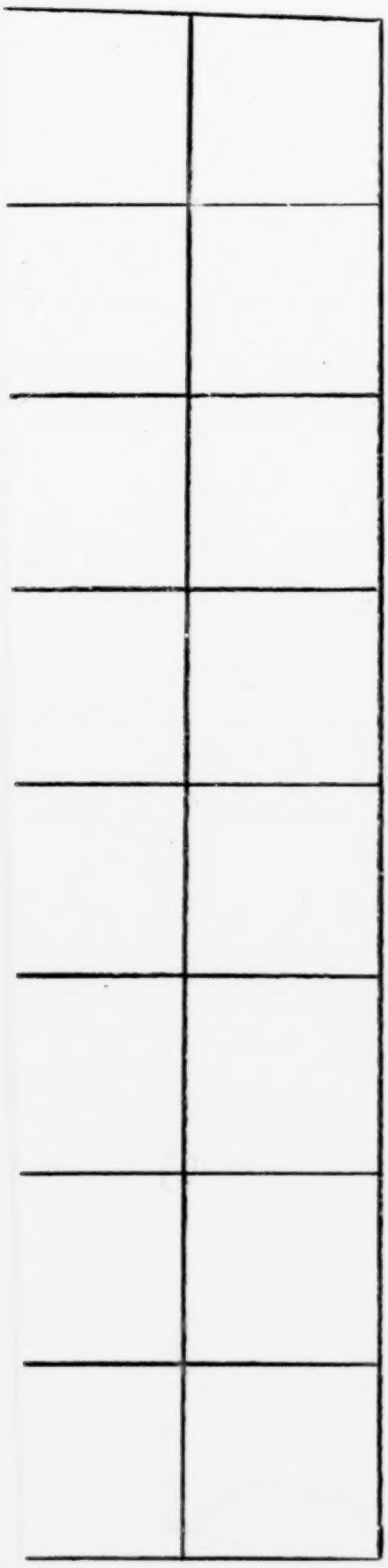
One work sheet (see next page) and ten of each of 2 kinds of counters, for example, ten red and ten black checkers, for each child.

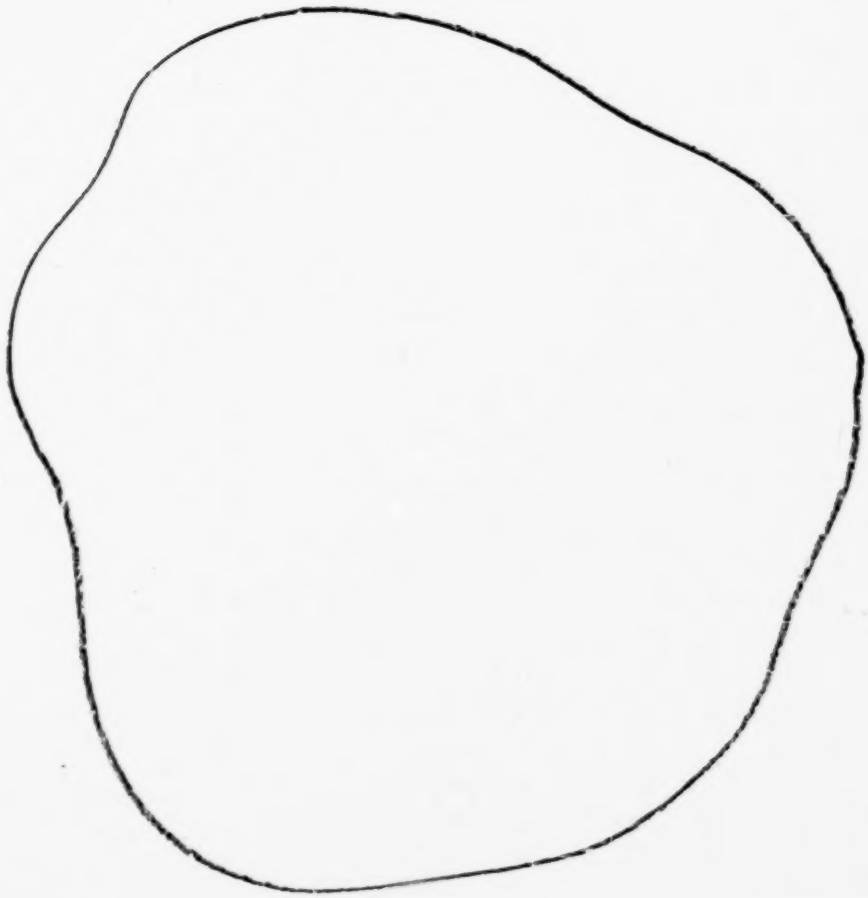
Arrangements:

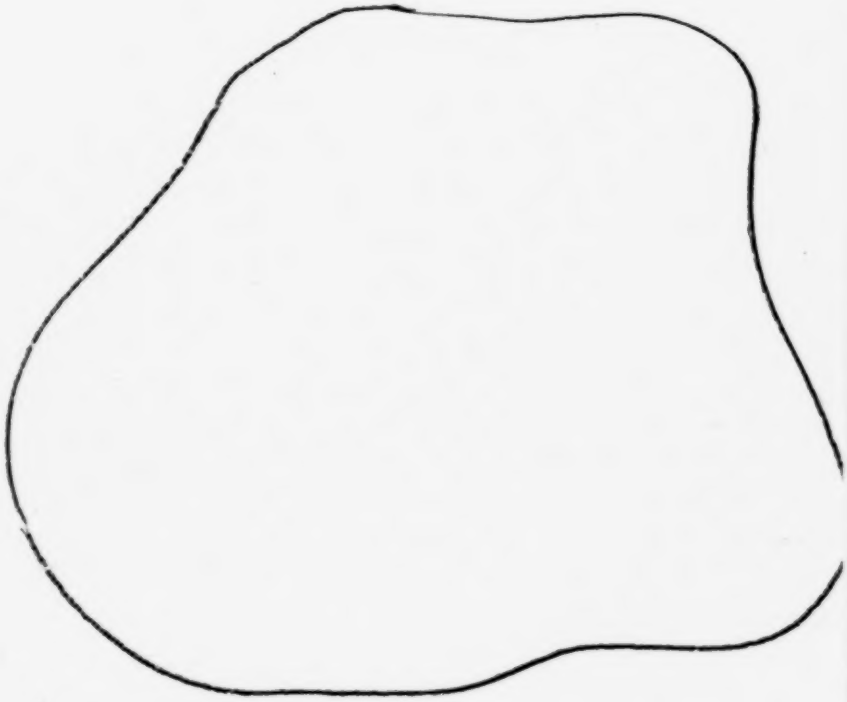
Appropriate for individual work. Children need a flat surface to work on.

Activity:

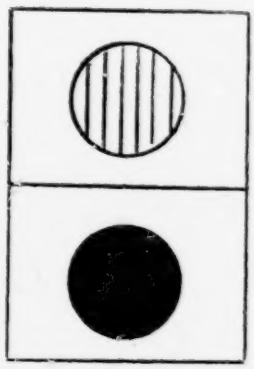
The children are to put some counters in each of the two closed curves on the work sheet. Check to be sure they have sorted them correctly; counters of one color or kind in one curve and counters of the other color or kind in the other. The children are now to form pairs by taking counters from the sets







and placing them in the boxes; a pair would look like the picture on the right. As in the previous activities, get the children to talk about what they are doing. If you purposely make some mistakes and ask the children in what way the pairs you formed are wrong, they will have more material for discussion.



This activity will lead directly into the next activity in which we will completely pair off two sets (if possible) and draw conclusions about the sets depending on whether the sets can be completely paired or not.

ACTIVITY SEQUENCE III

Matching

Objectives:

In this sequence of activities the children are to learn the relationship between pairing elements from two sets and the idea of equally numerous sets. The idea of equally numerous sets is expressed in three ways: The sets "match;" there are in one set "as many" as in the other; the sets have "the same number" of elements. Explicity, the idea is that if two sets can be put in one-to-one correspondence, then there are the same number of elements in each set.

Activity 1:

In this activity the class will work as a whole. Some children will participate while others watch. All children will be encouraged to talk about what they are doing.

Materials:

A supply of large toys or large blocks.

Arrangements:

The whole class is arranged more or less in a circle.

Activity: Have 3 boys and 3 girls stand at the front of the room:

Ask: "Who will pair off the girls and the boys?"

Say: "We can pair off these two sets so they match; there are as many boys as girls," or, "We can match these sets so there are the same number of girls as boys." Use these two statements about equally.

Do this several times using different numbers (but always the same number in each set so the sets match) and different criteria for set membership, for example, four children in red shirts and four blond children. You may also match toys and children or any other sets which seem appropriate to you. CAUTION: Do not say that these are equal sets; technically these sets are equivalent, that is, they have the same number of elements, but they are not equal.

Activity 2:

Small group activity.

Materials:

Blocks, counters, checkers, or other such things in two colors.

Arrangements:

Children at tables, four to six per table, or on the floor in groups of four to six.

Activity:

Teacher has red checkers, blocks, or other convenient material; each student has a small box with a few black checkers. Color is irrelevant, but teacher material should be different from student material. The teacher places a small number of her counters in the center of the table. Use 2, 3, 4, etc., counters; probe for the limits of correct performance.

Say: "Take out as many checkers as I have on the table."

Or: "Take out the same number of checkers as I have on the table."

Or: "Take out a set of checkers which will match the set I have on the table."

Use these three questions with about equal frequency. Word-for-word use of the questions above is not necessary, but be sure to use the three key phrases; as many, the same number, and match, in your questions. If the word "set" bothers you or the children, you may say "Take out some checkers which will match the ones I have on the table."

Responses:

If a student puts down the correct number of checkers, praise him and then ask him to show that they match. He should respond by pairing off the two sets. Follow this by asking "How do you know that there are as many red checkers as black checkers?" His answer should involve some expression of the idea that, if two sets can be paired off, then there are as many in one set as in the other. If a student puts down the wrong number of checkers ask him to check by pairing off. When he gets the correct number of checkers (after pairing and correcting), proceed as for a correct response. As with other activities, it will be helpful for you to match a set incorrectly and encourage the children to discuss the error.

Variations:

The students may play this matching game with all kinds of objects, with another student playing the teacher's part, with cups and napkins at juice time, etc. The most important features of this learning activity are that it can be done with many different kinds of objects and that the children are encouraged to talk about what they are doing.

Activity 3:

Whole class activity.

Materials:

A supply of large blocks or other suitable toys.

Arrangements:

The whole class will work together in a circle. Put 3 boys and 4 girls in the middle of the circle.

B B B G G G G

Ask: "Can someone pair off the girls and the boys?" Result:

Ask: "Does every boy have a partner?" (Yes) "Does every girl have a partner?" (No)

BG BG

BG G

Say: "Because one girl is not paired these sets do not match; there are more girls."

Do this several times using different numbers and different criteria of set membership. Use toys, blocks, children, etc., and continue this activity until you feel that most of the children have the idea. Now we will change the activity slightly and try to get the students to talk about the situation and to distinguish matching from nonmatching examples.

Activity 4:

Discriminating matching from nonmatching sets. Our objective is to teach the children to discriminate between matching and nonmatching sets and to express this discrimination verbally.

Materials:

Large blocks or other toys.

Arrangements:

Students in a circle, all students together; put four boys and four girls at the front of the room: Ask one of these questions; use each question with about equal frequence.

"Do these sets match?"

"Are there as many girls as boys?"

"Are there the same number of girls as boys?"

Student answers "Yes"

(Correct)

Say: "Show me that they match." The student should form pairs and show the match as a complete pairing. Help him if he needs help to do this.

Ask: "How do you know these sets match?" or "...there are as many girls as boys" or "...there are the same number of girls as boys?" An acceptable answer would involve the idea that they match because they can be completely paired, that is, paired so that none are left over.

Student answers "No"

(Incorrect)

Say: "Show me how you could pair them off." The student should form pairs and conclude from the complete pairing that the sets do match; when a pairing has been done, ask the initial question again. The answer should not be "Yes." Immediately put the sets back in the initial position, and ask the question a third time. The answer should still be "Yes," of course. Then ask, "How do you know...?" An acceptable answer would involve the idea that they match because they can be completely paired.

Now put three boys and four girls at the front of the room.

Ask one of these questions; use each question with about equal frequency.

"Do these sets match?"

"Are there as many boys as girls?"

"Are there the same number of girls as boys?"

Student answers "Yes"

(Incorrect)

Say: "Show me how they match." Pairing will reveal that these sets do not match; repeat the initial question; the answer should now be "No."

Ask: "How do you know they do not match?" or "...there are not the same number of girls as boys?" This question is to be phrased the same way as the initial question. An acceptable answer will involve the idea that, when you pair the sets, one girl is left unpaired.

Student answers "No"

(Correct)

Say: "Show me that they do not match." Pairing will verify that the sets do not match because one girl will be left unpaired.

Ask: "How do you know they do not match?" or "...there are not as many girls as boys?" or "...there are not the same number of girls as boys?" This question is to be phrased the same way as the initial question. An acceptable answer will involve the idea that, when you pair the sets, one girl is left unpaired.

Using the blocks, toys, etc., continue this activity until most children can discriminate matching and nonmatching examples and express this correctly, also.

Activity 5:

Individual work at tables.

Materials:

Each child should have a supply of counters and a copy of Frog Book One, MATCHING, which is Appendix I in this manual.

Arrangements:

Students working individually at tables.

The pages in the student text are not numbered. They should be arranged in the student text in the same way as in this booklet. Instructions will be given as though the first page following the cover was page number one, and so forth.

Page 1. Four frogs and four lily pads. Ask: "Are there as many frogs as there are lily pads?" "Make a line showing how each frog could jump to his own lily pad." Encourage the children to discuss this. How do we know there is one lily pad for each frog? An adequate answer would involve the idea of pairing with none left over, that is, matching.

Page 2. Four dogs and three dog houses. Ask the same sorts of questions. This time, however, the sets do not match. If the child draws a rope tying

each dog to a dog house he will observe one dog left over. Encourage discussion using "more," "fewer," and "not as many as."

Page 3. Four children and five kites. Same as page 2. Draw kite strings.

Page 4. Six children and six kites. Same as page 1. Draw kite strings.

Pages 5, 6, and 7. These pages are like pages 1 through 4 in that we are asking children to compare sets by matching, but they are more abstract. The same kinds of discussion should take place.

Pages 8, 9, and 10. Each of these pages is divided in half, and each requests two tasks of the children. All the tasks requested on these pages are essentially the same: Make marks in a box so that the set of marks matches the given set. On page 8 the first task is begun for the children. The teacher should feel free to help the children get started if they are hesitant.

ACTIVITY SEQUENCE IV

More Matching

Objectives:

In this activity sequence we will attempt to help children progress in understanding the notion that sets can be put in one-to-one correspondence (if they are equally numerous) independent of the size of the elements and their arrangement in space.

IMPORTANT NOTE: Some children may be completely unable to separate numerousness from space and size perceptions. Do not be concerned or anxious with these children or continue the activity to the point at which these children become frustrated.

Activity 1A:

Individual activity.

Materials:

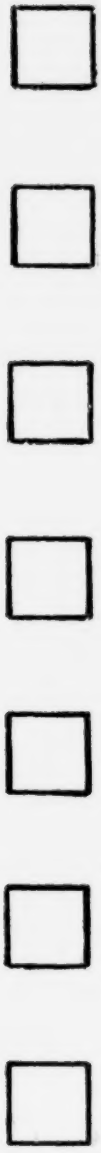
Each student must have a copy of each work sheet (next four pages) and a supply of counters. Use the work sheets one at a time and you may, of course, make up others if you feel that further activity is desirable.

Arrangements:

Students at tables.

Activity A:

Hand out the first work sheet, one for each student. Tell the students to get enough counters (checkers, tiles, or whatever you use) to match the set of



triangles on the paper. If you don't want to use the word, "triangle" you may say "spot" or "mark" instead.

Try This: For this activity, put the counters in a bin in the middle of the room. Have the children go and get counters leaving their papers on their desks. How many brought back just enough counters? _____; How many brought back too few? _____; too many? _____.

Be sure that each child has a set of counters which matches the set of triangles on the first work sheet. Ask the children to show you that the sets match, which they should do by forming pairs, possibly as shown in figure 1. Ask: "Are there the same number of checkers as triangles?" Then, "How do you know?" Or ask: "Are there as many checkers as triangles?" and again, "How do you know?" Encourage the children to talk about the relationship between counters and triangles.

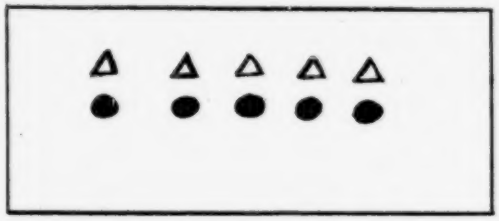


Figure 1

Now tell the students to put their checkers in a row. You may demonstrate. It should look like figure 2. Ask again the questions you asked previously. The response to the questions in this instance is crucial. Depending on age level, some or all of the children will now deny that these are "as many" or "the same number." They will believe that there are fewer counters or more triangles because the row of counters is shorter. With the students who

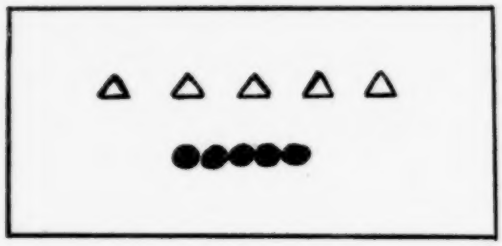


Figure 2

respond this way go through the following steps:

Ask them to match the triangles and the counters, as in figure 1, and ask the same questions again. Try to get the child to talk about the matching relation.

Go on to the next step, figure 2, and if the student now asserts that there are "the same number" or "as many as," then he may join the group who did this correctly the first time.

The child who still asserts that there are not the same number of counters as triangles (when they are in the position shown in figure 2), should be asked to try to match the two sets by drawing lines from the triangles to the counters. If the child does not now agree that the sets match, go on to the next activity. Be careful to ask: "How do you know?" when a child says that one set has "as many as" or "the same number as" another set. The answer should be expressed in terms of matching sets or the pairing of elements. This caution will prevent a child from offering an answer because he senses that answer will please you rather than because he understands the idea.

Activity 1B:

Hand out new work sheets to these students who had to draw lines on their sheets. Again match checkers and triangles as in figure 1, and encourage the students to discuss the relation by asking questions. Tell the students to spread their checkers out in a long row. You may demonstrate; it should look like figure 3. Proceed from this point as you did in activity A.

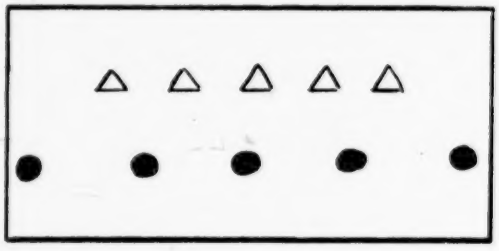


Figure 3

Activity 1C:

Use the remainder of the work sheets in the same way as the first one. The sequence for the use of each sheet is as follows:

a. Secure a set of counters which matches the set of marks on the paper.

b. Discuss the relation between the two sets using the phrases "they match," "the same number as," and "as many as." The important thing here is that the children talk about these sets.

c. Break up the pairs by pushing together or spreading apart the counters. Do the children still assert that there are "the same number," etc. of counters and marks?

d. For those children who do not see that the "same number" relation is preserved when the counters are moved, begin by reforming the matching and again discuss this matching relationship. Repeat step C and, when the counters are pushed together or spread out, draw lines to show the matching.

If you need more work sheets for these activities, try to make up your own. Please put a copy of each of your own sheets in this booklet.

Activity 2:

Individual activity.

Materials:

One copy of Frog Book Two, Appendix II of this manual, for each child.

Arrangements:

Pupils at tables arranged for individual work.

The pages of Frog Book Two are not numbered because the book is intended for children who have not yet been exposed to numerals. For this reason our procedure suggestions are made without reference to page numbers.

On each page you will find two sets of marks; these sets will match in some cases while in other cases they will not. The child is to decide whether the two sets match or not by the pairing-off process used previously. The children may draw lines connecting the elements and thus establish pairs on the pages if they wish. The purpose of this activity is to have the children to make a judgement about matching without being distracted by the size of the elements.

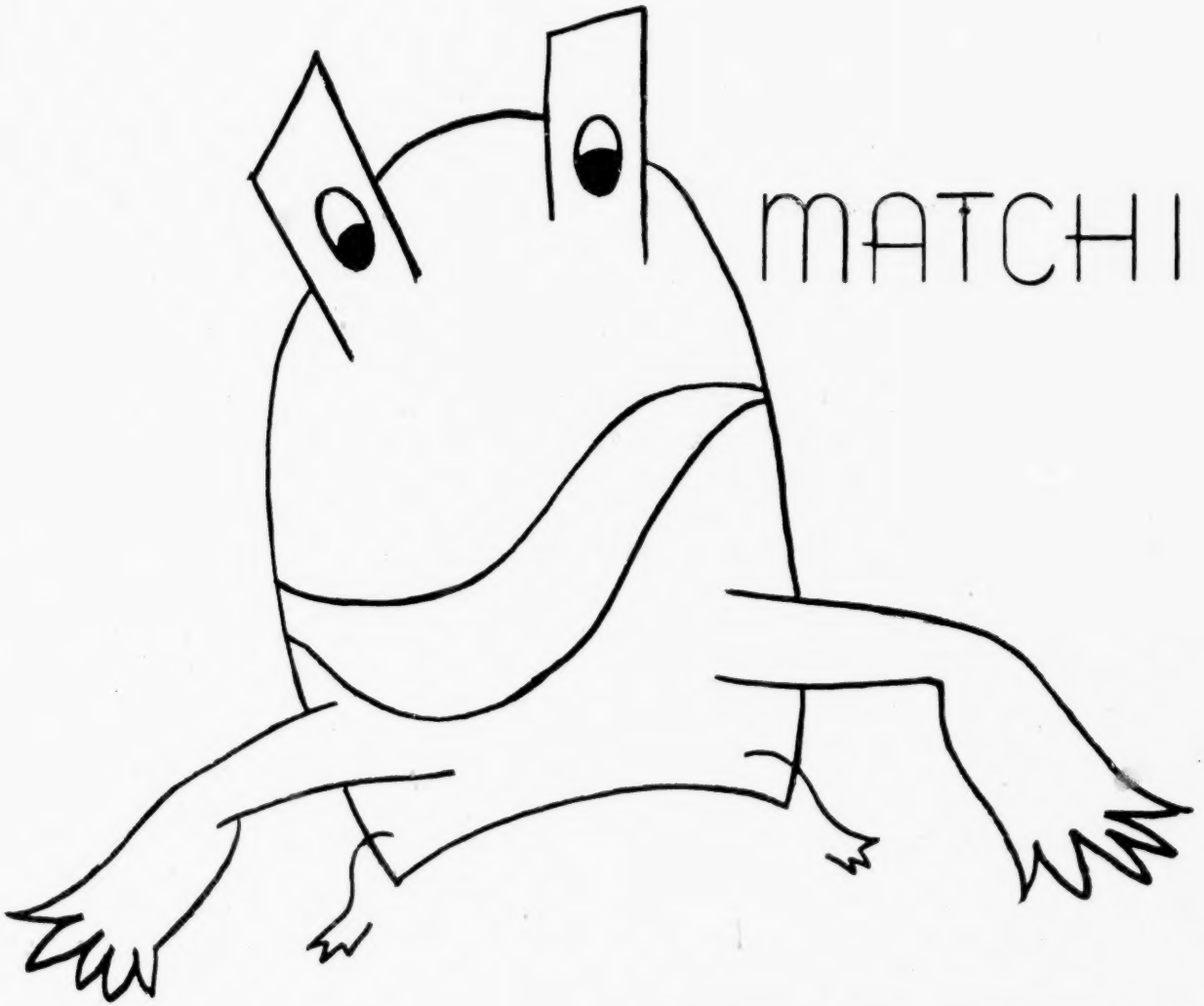
If a child makes an error on a page, that is, decides that the sets match when they do not or vice versa, ask him to form pairs by drawing lines, and try to lead him to the correct answer through the idea of pairing.

If you think that other pages similar to those in Frog Book Two would be helpful, you may make them up on your own. If you prefer to request new pages we will supply them. If you make up your own pages, please include a copy of each page in this manual.

APPENDIX I

MY NAME IS _____

MATCHING



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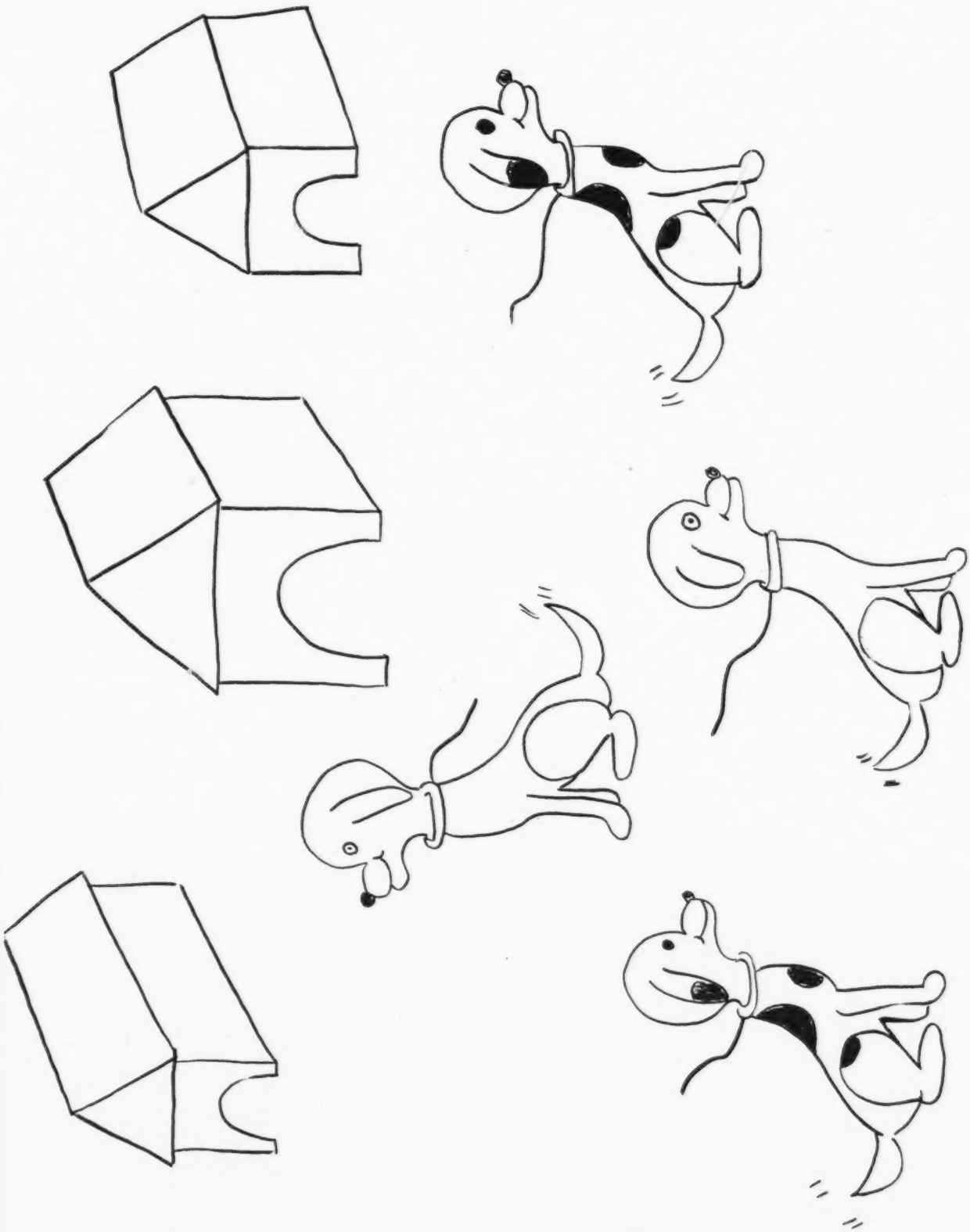

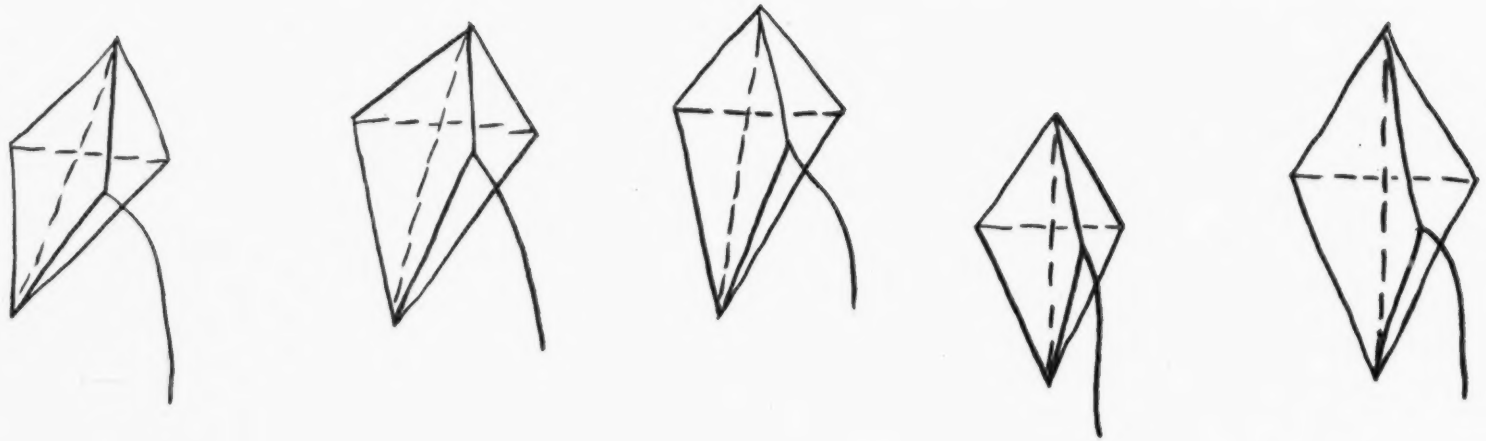

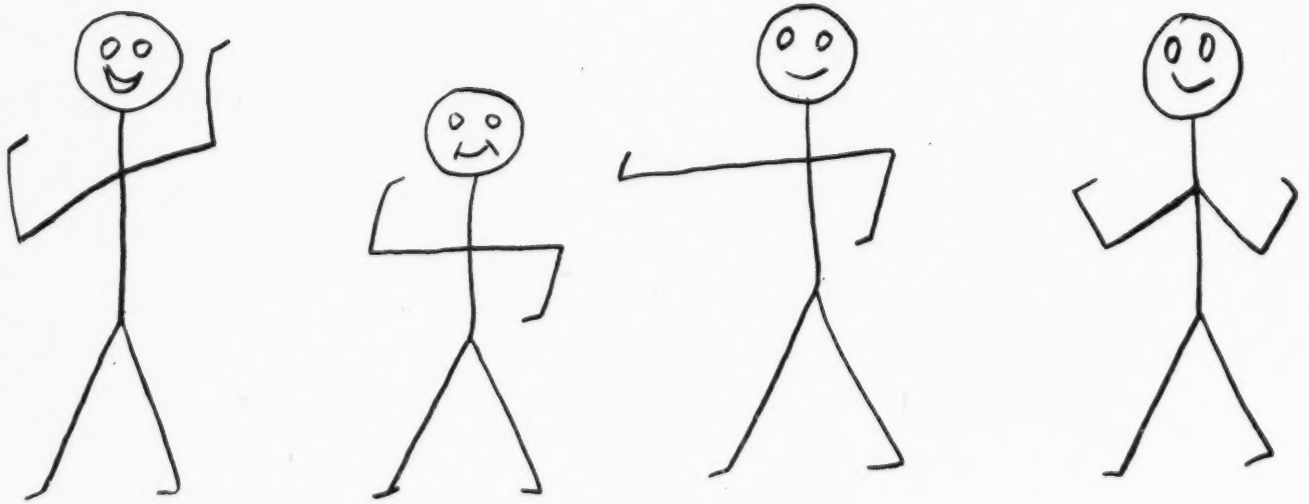

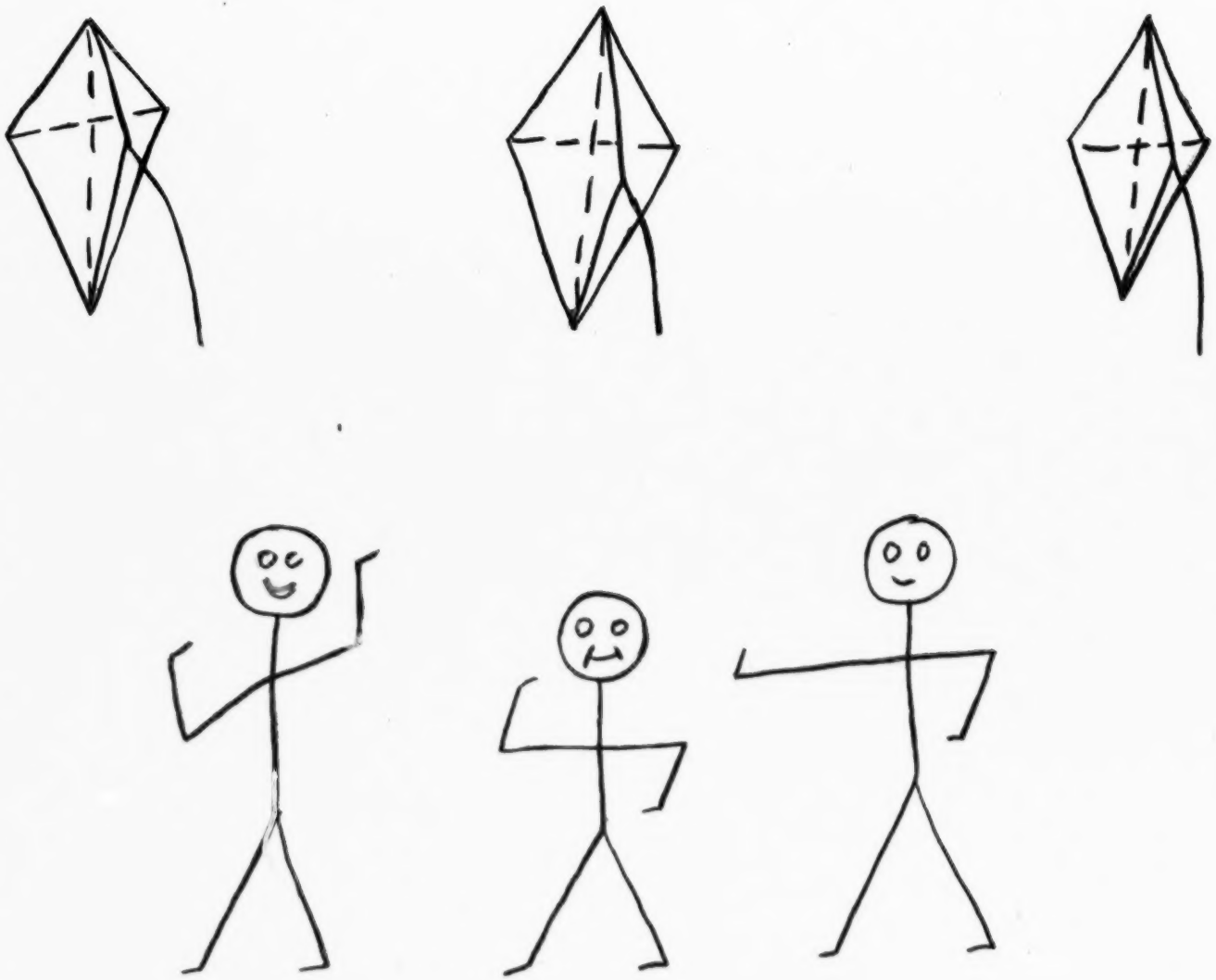

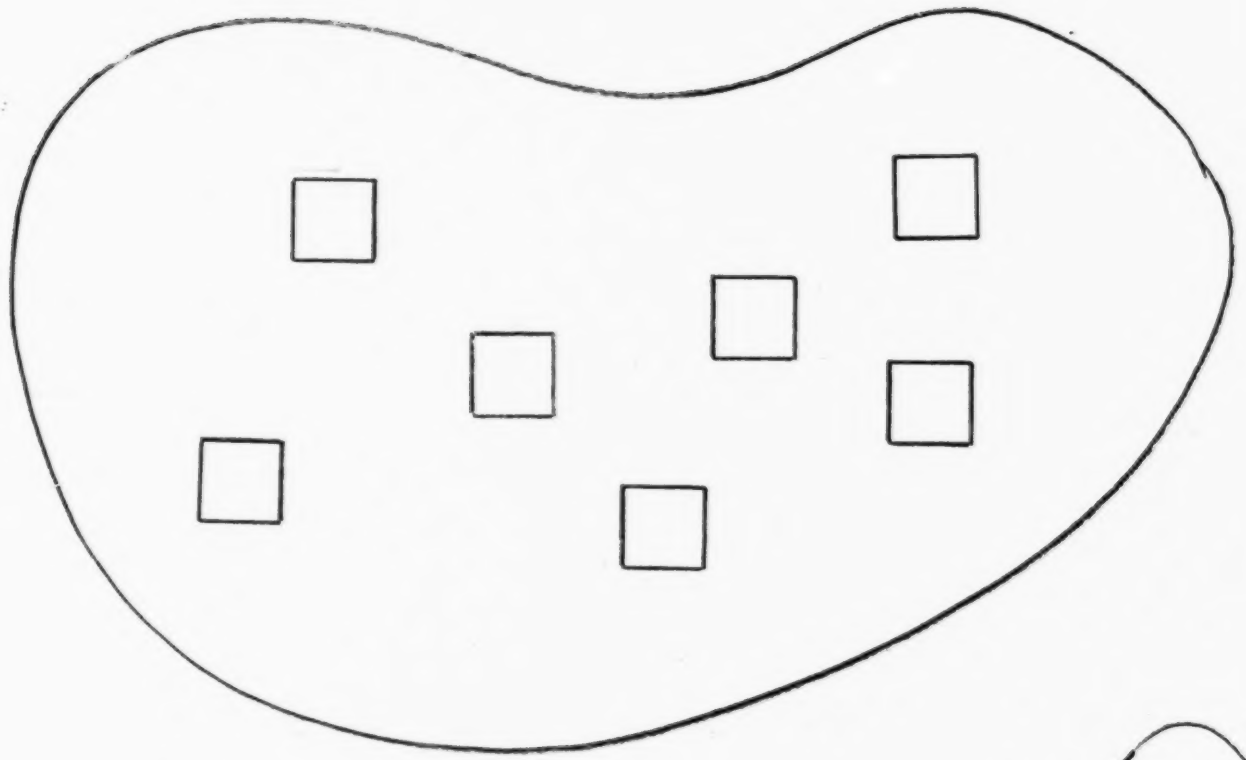

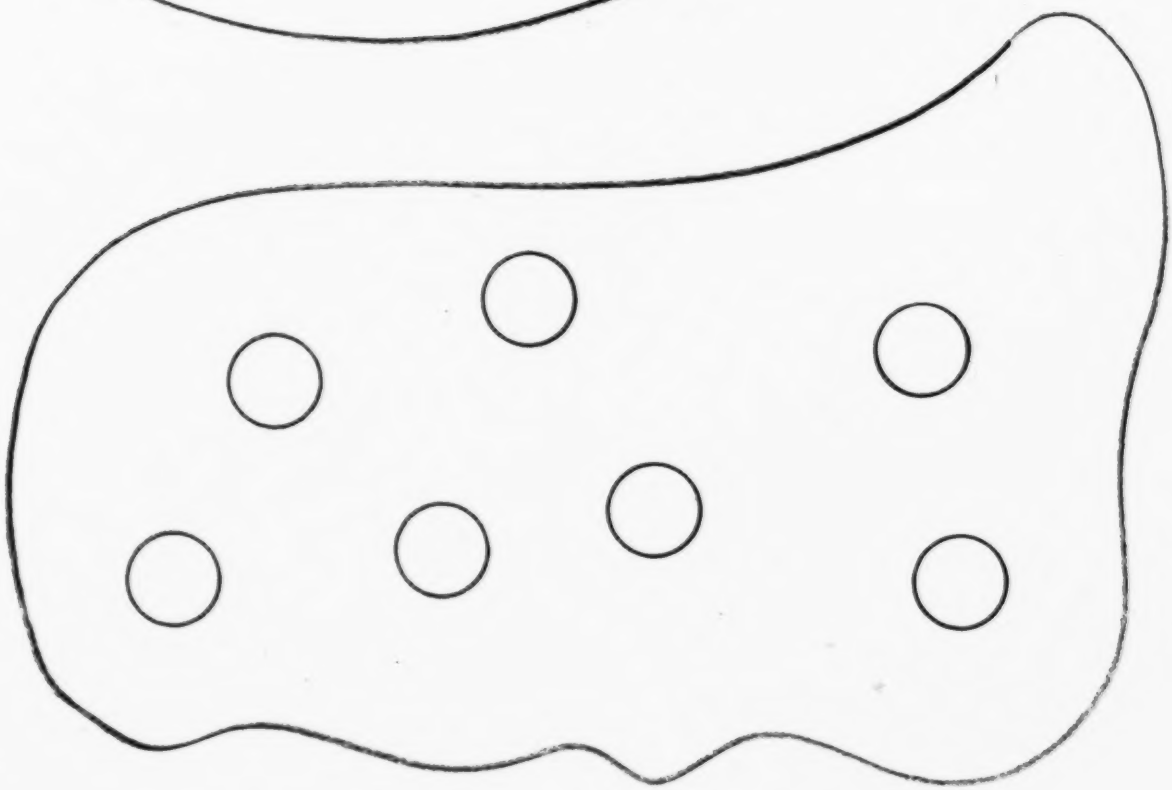

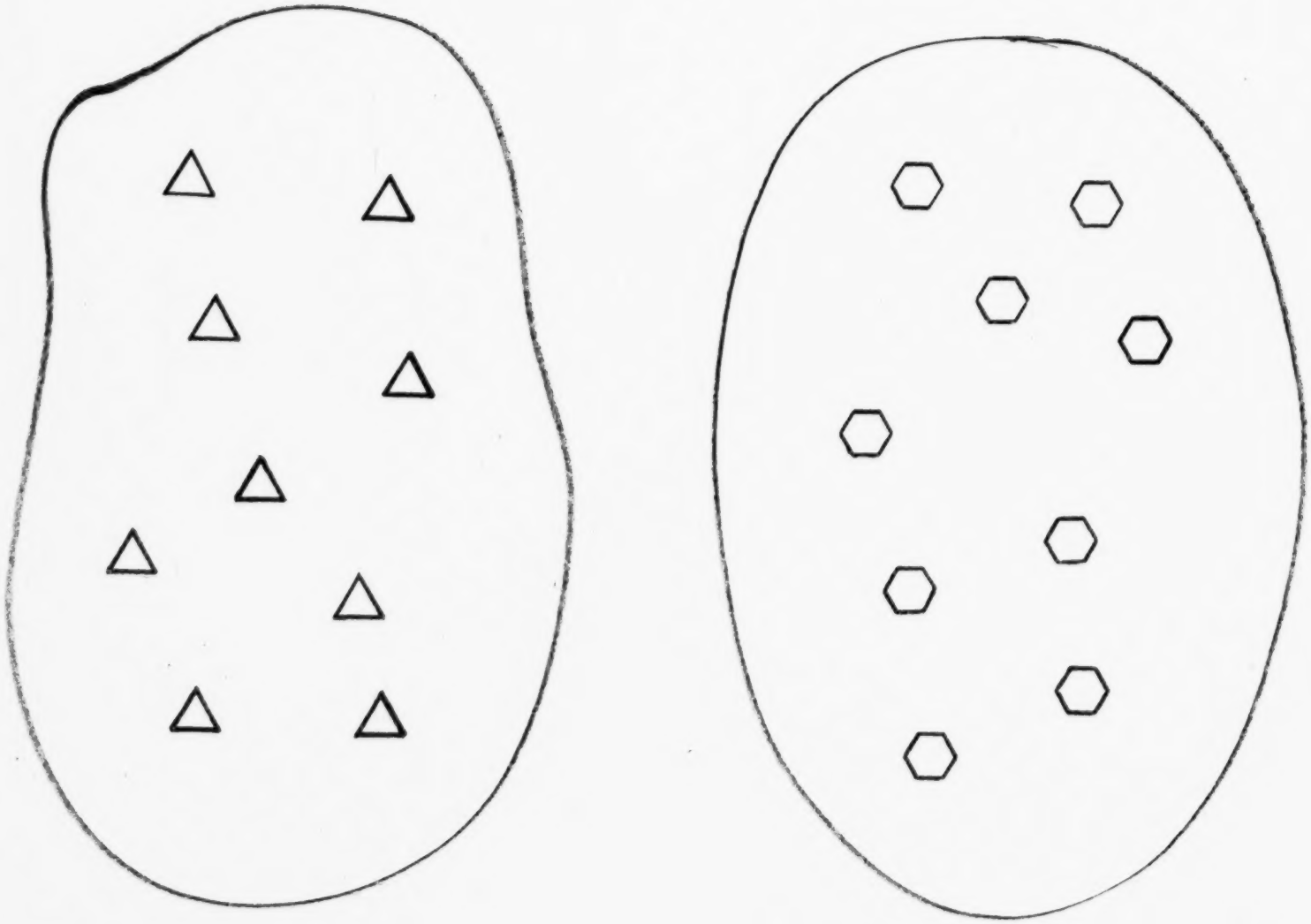

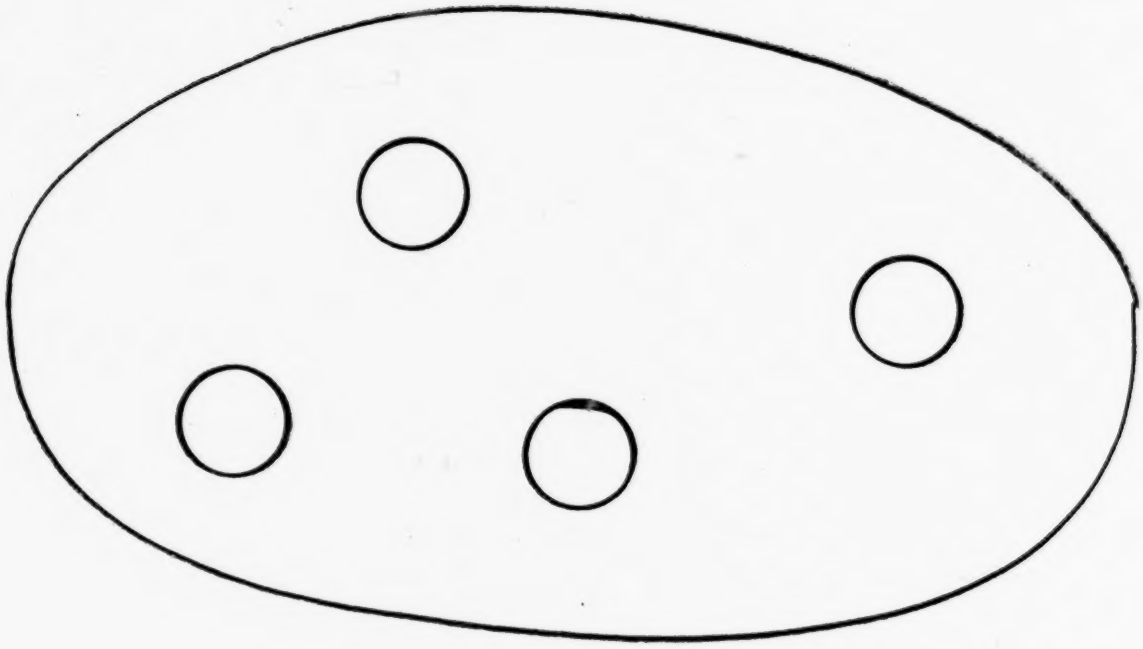

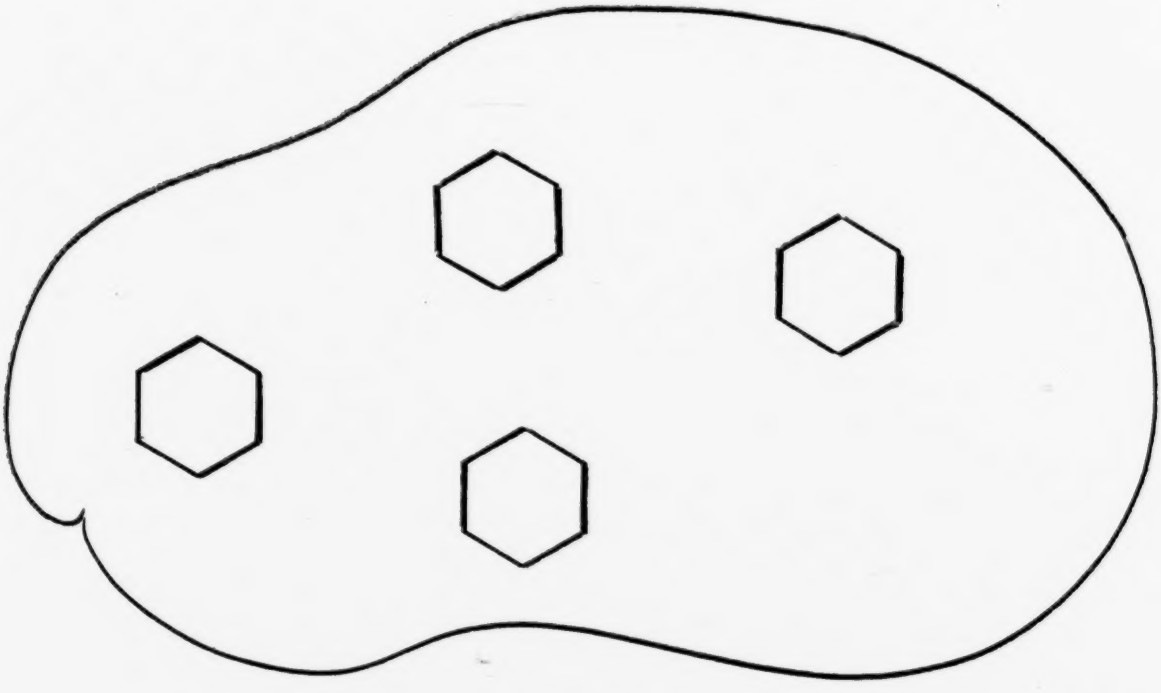

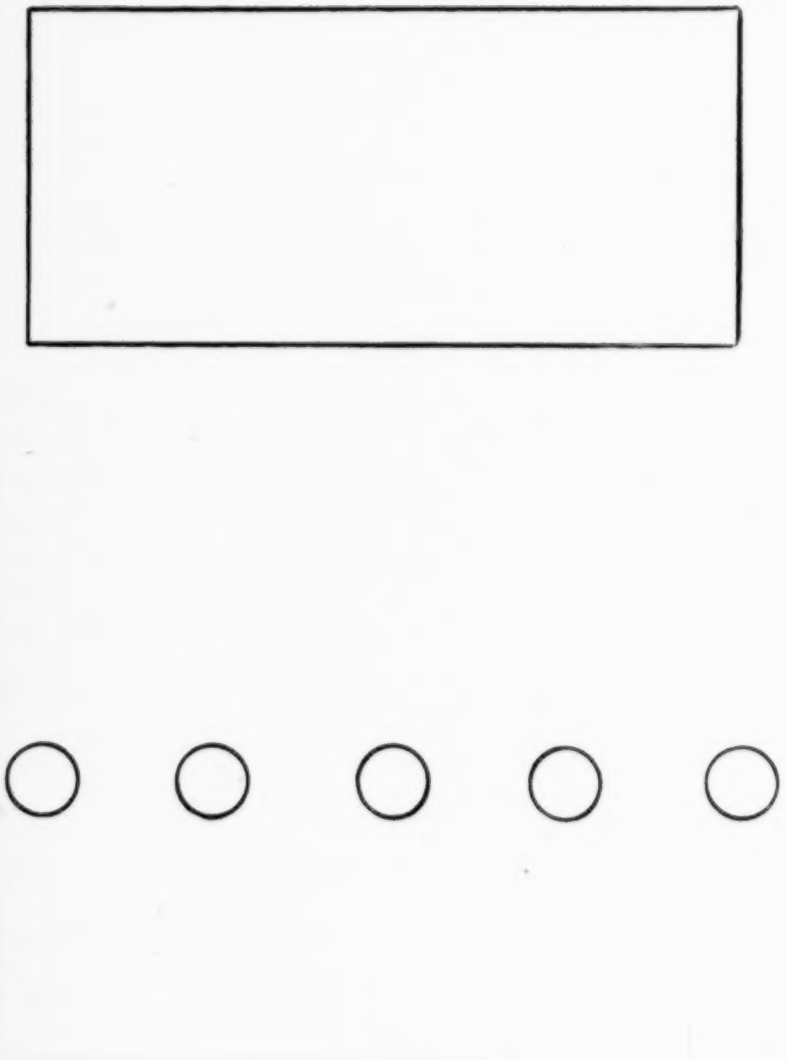

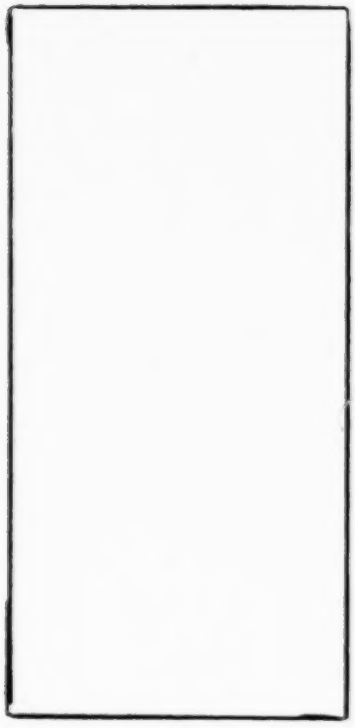

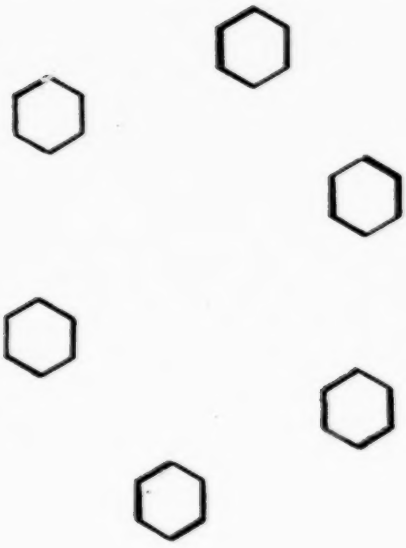

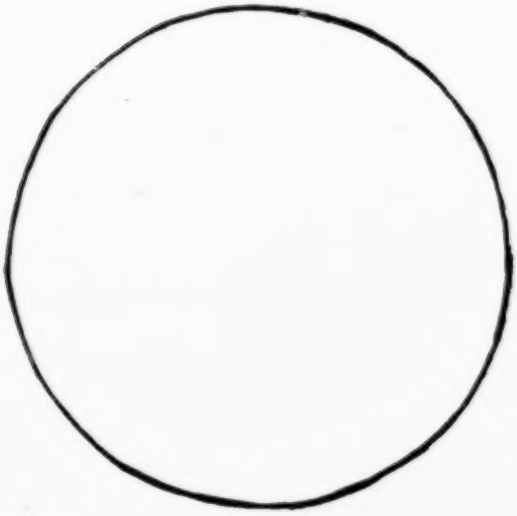

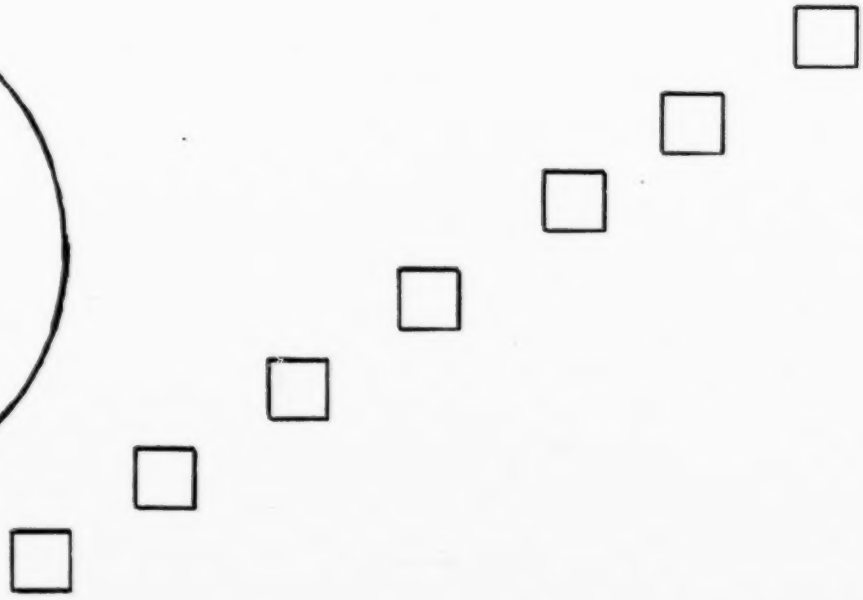

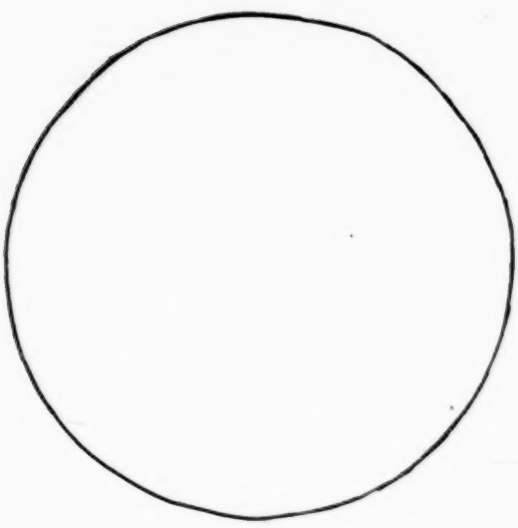

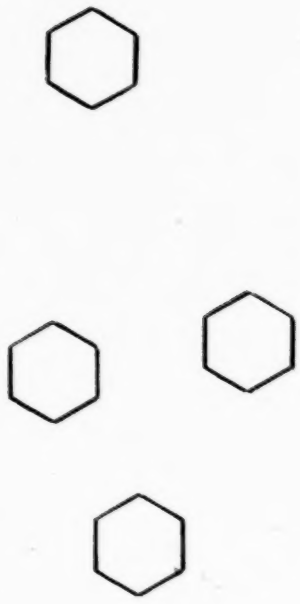

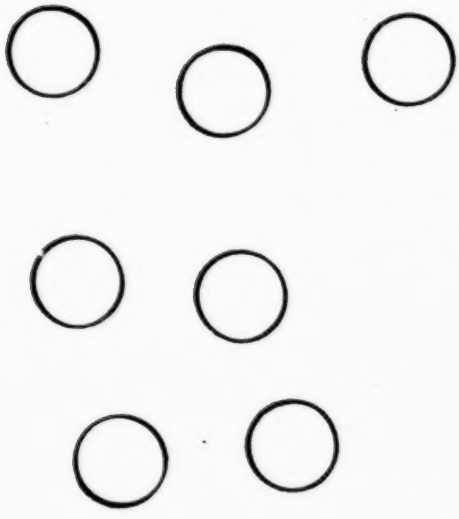

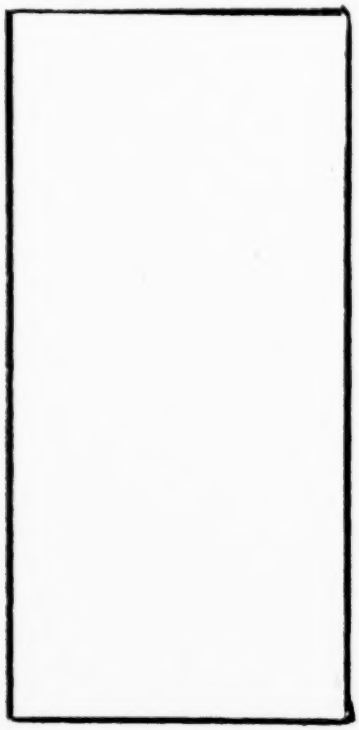

APPENDIX II

MY NAME IS _____

MATCHING

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